

CLAIMS

1. A stem cell marker characterized by binding to a GCTM-5 antibody or active fragment thereof.
- 5 2. A stem cell marker according to claim 1 which migrates on an SDS-PAGE gel with an apparent molecular weight of 50kDa.
3. A stem cell marker according to claim 1 or 2 wherein the GCTM-5 antibody or fragment is produced by a hybridoma having an ECACC accession number 03101603.
- 10 4. A stem cell marker according to any one of claims 1 to 3 including a GCTM-5 epitope or equivalent or a GCTM-5 antigen.
5. A stem cell marker according to any one of claims 1 to 4 of a ductal cell including a biliary cell or a biliary epithelial cell.
6. A stem cell marker according to any one of claims 1 to 5 of a hepatoblast.
- 15 7. A stem cell marker according to any one of claims 1 to 6 of a hepatic, pancreatic or endodermal stem cell.
8. A stem cell marker according to any one of claims 1 to 7 of a hepatic stem cell or progenitor cell.
9. A stem cell marker according to any one of claims 1 to 7 of a pancreatic stem cell or progenitor cell.
- 20 10. A detector of a cell type which identifies on the cell type a cell marker according to any one of claims 1 to 9.
11. A detector according to claim 10 which is an antibody, fragment or equivalent thereof, ligand or complimentary molecule to the cell marker.
- 25 12. A detector according to any one of claims 10 or 11 which is an antibody, fragment or equivalent thereof.
13. A detector according to any one of claims 10 to 12 which is a GCTM-5 antibody or active fragment thereof.
- 30 14. A detector according to any one of claims 10 to 13 which can compete against a GCTM-5 antibody for binding.
15. A detector according to claim 13 that is produced by a hybridoma having an ECACC accession number 03101603.

16. A detector according to any one of claims 10 to 15 which detects the cell marker on a stem cell.
17. A detector according to any one of claims 10 to 16 which detects the cell marker on a sub population of stem cells.
- 5 18. A detector according to any one of claims 10 to 17 wherein the stem cell is a hepatoblast.
19. A detector according to claim 17 or 18 wherein the stem cell is a hepatic stem cell or a hepatic progenitor cell.
20. A detector according to claim 17 or 18 wherein the stem cell is a pancreatic
- 10 stem cell or a pancreatic progenitor cell.
21. A detector according to any one of claims 16 to 18 wherein the stem cell is a cell of the biliary epithelium.
22. A detector according to any one of claims 16 to 21 where in the stem cell is proliferating.
- 15 23. A hybridoma which produces an antibody to a cell marker according to any one of claims 1 to 9.
24. A hybridoma which produces a GCTM-5 antibody or fragment thereof.
25. A hybridoma according to claim 24 which has an ECACC accession number 03101603.
- 20 26. A method of identifying a sub-population of stem cells in a cell sample, said method including
 - identifying the stem cells which express a marker according to any one of claims 1 to 9.
27. A method according to claim 26 wherein the subpopulation of stem cells
- 25 includes a hepatoblast.
28. A method according to claim 26 or 27 wherein the subpopulation includes a hepatic stem cell or a hepatic progenitor cell.
29. A method according to claim 26 or 27 wherein the subpopulation includes a pancreatic stem cell or a pancreatic progenitor cell.
30. 30. A method according to claim 26 or 27 wherein the subpopulation includes a biliary cell or a biliary epithelial cell.

31. A method according to any one of claims 27 to 30 wherein the stem cell or progenitor cell is proliferating.
32. A method according to any one of claims 26 to 32 wherein the stem cells are identified by a GCTM-5 antibody or fragment thereof.
- 5 33. a method according to claim 32 wherein the GCTM-5 antibody or fragment thereof is produced by a hybridoma having an ECACC accession number 03101603.
34. A method according to any one of claims 26 to 33 further comprising subjecting the stem cells to markers selected from the group including N-CAM, HEA 10 -125, CK-19, harmonin and Ep-CAM.
- 10 35. A method of isolating a sub population of stem cells, said method comprising isolating the stem cells which express a marker, said marker according to any one of claims 1 to 9.
36. A method according to claim 35 wherein the subpopulation of stem cell 15 includes a hepatoblast.
37. A method according to claim 35 or 36 wherein the subpopulation of stem cells includes a hepatic stem cell or a hepatic progenitor cell.
38. A method according to claim 35 or 36 wherein the subpopulation of stem cells includes a pancreatic stem cell or a pancreatic progenitor cell.
- 20 39. A method according to claim 35 or 36 wherein the subpopulation of stem cells includes a biliary cell or a biliary epithelial cell.
40. A method according to any one of claims 35 to 39 wherein the stem cell or progenitor cell is proliferating.
- 25 41. A method according to any one of claims 35 to 40 wherein the cells are isolated using a GCTM-5 antibody, fragment or equivalent thereof.
42. A method according to claim 41 wherein the GCTM-5 antibody or fragment thereof is produced by a hybridoma having an ECACC accession number 03101603.
- 30 43. A method according to any one of claims 35 to 42 further including isolating cells that select for or against markers, said markers selected from the group including N-CAM, HEA-125, CK-19, harmonin and Ep-CAM.

44. A subpopulation of cells which express a marker according to any one of claim 1 to 9.
45. A subpopulation of stem cells prepared by the method according to any one of claims 35 to 43.
- 5 46. A subpopulation according to claim 44 or 45 including a heptablast.
47. A subpopulation according to claim 44 or 46 including hepatic stem cells or hepatic progenitor cells.
48. A subpopulation according to claim 44 or 46 including pancreatic stem cells or pancreatic progenitor cells.
- 10 49. A subpopulation according to claim 44 or 46 including biliary cells or biliary epithelial cells.
50. A subpopulation according to any one of claim 44 to 49, wherein the stem cells or progenitor cells are proliferating.
51. A subpopulation according to any one of claims 44 to 50 including liver cells.
- 15 52. A subpopulation according to any one of claims 44 to 50 including pancreatic cells.
53. An isolated cell which expresses a marker according to any one of claims 1 to 9.
54. An isolated cell derived from a subpopulation according to any one of claims 20 44 to 52.
55. A isolated cell according to any one of claims 53 or 54 which is a hepatoblast.
56. An isolated cell according to any one of claims 53 to 55 which is a hepatic stem cell or a hepatic progenitor cell.
- 25 57. An isolated cell according to any one of claims 53 to 55 which is a pancreatic stem cell or a pancreatic progenitor cell.
58. An isolated cell according to any one of claims 53 to 55 which is a biliary cell or a biliary epithelial cell.
59. An isolated cell according to any one of claims 53 to 58 wherein the stem cell 30 or progenitor cell is proliferating.
60. A method of culturing a hepatic or pancreatic stem cell or progenitor cell, said method comprising

isolating the cells which express a marker according to any one of claims 1 to 9; and

culturing the cells.

61. A method according to claim 60 wherein the isolated stem cell is a 5 hepatoblast.

62. A method according to claim 60 or 61 wherein the hepatic or pancreatic stem cell or progenitor cell is further differentiated to a cell selected from the group including a hepatoblast, liver, hepatic or pancreatic cell.

63. A method according to claim 62 wherein the hepatic stem cell is further 10 differentiated to a liver cell.

64. A method according to claim 62 wherein the hepatic stem cell is further differentiated to a pancreatic cell.

65. A method according to any one of claims 60 to 64 wherein the hepatic stem cell is proliferating.

66. A use of the cells which express a marker according to any one of claims 1 to 15 9, said use selected from the group including transplantation, *ex vivo* expansion, reprogramming to generate other cell types and for identifying new therapeutic agents that may affect how these cells live, grow, replicate, differentiate and die.

67. A method of treating a liver disorder in a patient, said method comprising:

isolating a liver stem cell by a method according to any one of claims 35 to 20 43; and

transferring the liver stem cell to the patient.

68. A method according to claim 67 wherein the liver stem cell is a hepatoblast.

69. A method according to claim 67 or 68 wherein the liver stem cell is 25 proliferating.

70. A method according to any one of claims 67 to 69 wherein the liver stem cell is caused to further differentiate to a liver cell.

71. A method according to any one of claims 69 to 70 wherein the liver disorder is selected from the group including PBC, EHBA or ALD.

72. A method of treating a pancreatic disorder in a patient, said method 30 comprising:

isolating a liver stem cell by a method according to any one of claims 35 to 43; and

transferring the liver stem cell to the patient.

73. A method according to claim 72 wherein the liver stem cell is a hepatoblast.

5 74. A method according to claim 72 or 73 wherein the liver stem cell is proliferating.

75. A method according to any one of claims 72 to 74 wherein the liver stem cell is caused to further differentiate to a pancreatic cell.

10 76. A method according to any one of claims 72 to 75 wherein the pancreatic disorder is diabetes.

15 77. A method of treating a liver or pancreatic cancer, said method including delivering a toxin conjugated to a GCTM-5 antibody or active fragment thereof to a liver or pancreatic stem cell or liver or pancreatic progenitor cell in the liver or pancreatic cancer, wherein the cell expresses a marker according to any one of claims 1 to 9.

78. A method according to claim 77 wherein the liver or pancreatic stem cell or progenitor cell is proliferating.

20 79. A method of diagnosing or monitoring a liver or pancreatic condition in a patient, said method comprising detecting GCTM-5 antigen, epitope or equivalent in a biological sample.

80. A method according to claim 79 wherein the GCTM-5 antigen, epitope or equivalent is detected with a GCTM-5 antibody, or fragment thereof.

81. A method according to claim 80 wherein the GCTM-5 antibody or fragment is produced by a hybridoma having an ECACC accession number 03101603.

25 82. A method according to any one of claims 79 to 81 wherein the biological sample is body fluid or a tissue sample.

83. A method according to any one of claims 79 to 82 wherein the liver condition is selected from the group including PBC, EHBA, ALD, transplantation of liver stem cells and *in vivo* expansion of liver stem cells.

30 84. A method according to any one of claims 79 to 82 wherein the pancreatic condition is selected from the group including diabetes, pancreatic malignancies,

transplantation of pancreatic stem cells and *in vivo* expansion of pancreatic stem cells.

85. A kit for detecting a cell marker said kit including a detector which detects the marker according to any one of claims 1 to 9.

5 86. A kit according to claim 85 which detects a cell marker on a subpopulation of stem cells or in a biological sample.

87. A kit according to claim 85 or 86 which detects the cell marker on a hepatoblast.

88. A kit according to any one of claim 85 to 87 which detects the cell marker on 10 a hepatic stem cell or a hepatic progenitor cell.

89. A kit according to any one of claim 85 to 88 which detects the cell marker on a pancreatic stem cell or a pancreatic progenitor cell.

90. A kit according to any one of claim 85 to 87 which detects the cell marker on a biliary cell or a biliary epithelial cell.

15 91. A kit according to any one of claim 85 to 90 which detects the cell marker on a stem cell that is proliferating.

92. A kit according to any one of claim 85 to 91 which detects the cell marker in a biological sample including cell culture, tissue culture, conditioned medium, tissue sample, blood, serum, plasma and other bodily fluids and biopsy samples.

20 93. A kit according to any one of claims 85 to 92 wherein the detector is a GCTM-5 antibody or active fragment thereof.

94. A kit according to claim 93 wherein the antibody is produced by a hybridoma having an accession number ECACC 03101603.

25 95. A kit for isolating a subpopulation of stem cells, said kit comprising a detector for detecting cells expressing a marker according to any one of claims 1 to 9 and a means to separate the cells detected by the detector.

96. A kit according to claim 95 which isolates a hepatoblast.

97. A kit according to claim 95 or 96 which isolates a hepatic stem cell or a hepatic progenitor cell.

30 98. A kit according to any one of claim 95 to 97 which isolates a pancreatic stem cell or a pancreatic progenitor cell.

99. A kit according to any one of claim 95 to 98 which isolates a biliary cell or a biliary epithelial cell.
100. A kit according to any one of claim 95 to 99 which isolates a stem cell that is proliferating.
- 5 101. A kit according to any one of claim 95 to 100 which isolates a stem cell from a biological sample including cell culture, tissue culture, conditioned medium, tissue sample, blood, serum, plasma and other bodily fluids and biopsy samples.
102. A kit according to any one of claims 95 to 101 wherein the detector is a GCTM-5 antibody or active fragment thereof.
- 10 103. A kit according to claim 102 wherein the antibody is produced by a hybridoma having an accession number ECACC 03101603.